

THE INFLUENCE OF A FIRE IN APRIL ON THE REPRODUCTION OF THREE SPECIES OF THE PROTEACEAE

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ABSTRACT

The crown cover and density of three species of the Proteaceae were studied in plots on Paarl Mountain burned early in April 1961. The density of *Protea repens* and *P. burchellii* decreased markedly in all the plots studied while the density of *Leucadendron rubrum* decreased in some plots and increased in others.

The conclusion is that this autumn fire was unfavourable for the reproduction of the two *Protea* species.

UITTREKSEL

DIE INVLOED VAN 'N HERFSBRAND OP DIE VOORTPLANTING VAN DRIE SPECIES VAN DIE PROTEACEAE

Die kroondekking en digtheid van drie spesies van die Proteaceae is bestudeer in persele op Paarlberg wat vroeg in April 1961 gebrand is. Die digtheid van *Protea repens* en *P. burchellii* het opvallend in al die persele afgeneem, terwyl die digtheid van *Leucadendron rubrum* in sommige persele afgeneem en in ander toegeneem het.

Die gevolgtrekking word gemaak dat hierdie herfsbrand ongunstig vir die voortplanting van die twee *Protea* spesies was.

INTRODUCTION

In studying certain aspects of the reproduction of *Protea repens* (L.) L. (= *P. mellifera*), Jordaan (1949) concluded that January to March is a safe, April to June is an unfavourable and July to December is a dangerous period to burn this species in the veld. He also suggested that for other species of plants, which depends only on seed for reproduction, a safe and a dangerous period in a year to burn them can be expected.

The essence of the hypothesis put forward by Jordaan is that there are safe and dangerous periods during a year to burn species dependent on seed for regeneration. According to this hypothesis there must be, between these safe and dangerous periods, periods in which it is more or less safe/unsafe to burn them.

In studying the influence of a fire early in June 1960 on four species of the Proteaceae on the Paarl Mountain the following were the results (Jordaan, 1965): All plants and seeds of *Protea repens* and *P. burchellii* Stapf

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(=*P. pulchella*) were destroyed; plants of *Leucadendron rubrum* Burm. f. (= *L. plumosum*) were totally destroyed, but a few seeds remained to regenerate the species; all seeds of *L. salignum* Berg. (= *L. adscendens*) were destroyed but the plants sprouted from buds protected in or near the ground.

In 1972 Jordaan referred to the influence of fire at different times of the year on the reproduction of species of Proteaceae in a general discussion of the generative reproduction of the Proteaceae.

PROCEDURE

To control fires on the Paarl Mountain the Municipality of Paarl divided the mountain into six blocks (Map PW 854, dated August 1958, of the Municipality of Paarl). Block A was burnt early in April 1961 (therefore in the middle of autumn). I undertook to study the reaction of the Proteaceae to this autumn fire.

For purposes of study nine plots were delimited in Block A.

As in the case of the plot burned in June 1960 the vegetation in Block A was judged to be about 12 years old.

Although the area was well covered (crown cover about 80 %), the vegetation did not burn very well when it was put to fire early in April 1961. The results discussed here are based on observations made in April 1967—six years after the fire—in four plots that were well burnt. The areas surrounding these plots were also well burnt.

The crown cover of the species was estimated and their density was expressed as the number per 100 m².

RESULTS

Protea repens and *Leucadendron rubrum* were present in all four plots studied. *P. burchellii* was present in only two of them. All three species were fairly evenly distributed in Block A.

All three species were produced only by seed.

The crown cover and the density of the species before and after the fire are set out in Table 1.

TABLE 1.
Crown cover and density of species before and after an autumn fire

Species	Crown cover		Density	
	Before Burn	After Burn	Before Burn	After Burn
<i>Protea repens</i>	8	+	63	7
<i>Protea burchellii</i>	2	+	138	72
<i>Leucadendron rubrum</i>	17	22	350	298

The crown cover and the number of plants of *P. repens* decreased markedly in all plots studied and it is concluded that the fire early in April was very unfavourable to the reproduction of this species. In the case of *P. burchellii* which was present in only two of the four plots studied, the crown cover and density decreased in both plots but not so markedly. The results indicate, however, that the fire early in April was unfavourable to the regeneration of *P. burchellii*.

The figures for *L. rubrum* give the impression that the crown cover and density was little affected by the fire. The results, however, differ in different plots. In one plot the crown cover and density decreased markedly (density from 750 to 250), but in three plots crown cover and density increased.

L. rubrum occurred in all nine plots in Block A. A similar variation in crown cover and density was found in the other five plots.

The results indicate that the fire early in April was not dangerous to the reproduction of *L. rubrum*. In three plots it was favourable and in one unfavourable.

DISCUSSION

As far as *Protea repens* is concerned the results are evidence that, as expected by Jordaan (1949), April is an unfavourable period to burn it. The results show that the fire in April was also unfavourable for the reproduction of *P. burchellii*. It was unfavourable in the sense that the density decreased. Both species, however, regenerated after the fire.

The reaction of *Leucadendron rubrum* differed from that of the two *Protea* species in that the effect was favourable in some plots and in others unfavourable. The reaction to the fire in winter (Jordaan, 1965) also differed from that of the two *Protea* species in that it was unfavourable for the regeneration by seed for *L. rubrum* and detrimental to the *Protea* species.

In assessing the influence of the fire in winter on *L. rubrum* the possibility of the dispersal of seed by wind into the area studied was taken into consideration (Jordaan, 1965). Wind might also have had an influence on the results of the fire in autumn on *L. rubrum*. The difference in the regeneration in the different plots might be due to the seed having been blown in and out of the plots. In the case of *P. repens* and *P. burchellii* the results were such that there is no reason for doubt that the fire in winter was detrimental to and the one in autumn unfavourable for the regeneration of the two *Protea* species.

Bond (1980) reports the influence of a fire in March (autumn) and in September (spring) in mature (20 years) and senescent (40–45 years) fynbos in the Swartberg. The fynbos contained, amongst others, *Protea repens* and *Leucadendron rubrum*. The Proteaceae regenerated well after the fire in March.

The different reactions of a species to fire in different months of the year is of great importance for the conservation of the species concerned and is a subject that needs further study. A priority is to get results of fires in different months of the year on individual species.

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